µAC Controllore per armadi di condizionamento
µAC Electronic control for air-conditioning units

µAC

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READ AND SAVE
THESE INSTRUCTIONS

Manuale d'uso

User manual

CAREL

Tecnologia ed Evoluzione

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1. General characteristics

1.1 General description

The **EMIPRO** is an electronic control for the complete management of precision air-conditioners, both in direct expansion versions (with 1 or 2 compressors), with 1 or 2 heating elements or with batteries (valve on
the heating battery and/or valve on the cooling battery).
The control also allows the management of a humidifier and dehumidification with various pre-settable configurations.

Main functions:

- Control based on the temperature and humidity of the inlet air
- Energy saving with free-cooling (Shelters) or compensation
- Dehumidification management
- Control of the supply fan speed
- Complete alarm management with log
- Rotation of a series of units
- Time bands
- Can be connected to a serial line for supervisor / telemaintenance

Controlled devices:

- 1 or 2 compressors or valve for cooling battery
- 1 or 2 heating elements or valve for heating battery
- Supply fan in ON-OFF or proportional mode
- Humidifier with proportional or ON-OFF output
- Dehumidification with ON-OFF output
- Alarm device

Options:

- RS485 serial board
- Clock board with memory for logging the alarms and time bands
- Fan control modules
- Programming key

2. EMIPRO user interface

The EMIPRO is made up of a display and a power board, see Fig. 1.

Fig. 1

2.1 The display

Fig. 2

N.B. Fig. 2 illustrates all the symbols and the messages shown on the display; this occurs on starting the regulator.

8.8.8.8	*ambient temperature* *in prog. displays the value of the parameter*
°C or °F	*temp. unit of measure: degrees Centigrade/Fahrenheit*
88	*ambient humidity* *in programming displays the no. of the parameter*
%rH	*relative humidity unit of measure*
	buzzer active
	hour counter limit exceeded
	OFF status from time bands
A	*time bands active*
ON OFF	*external contact status:* *- ON - machine enabled* *- OFF - machine in stand-by*
	indicates that the value displayed is the temperature *(with this symbol off the Set-point is displayed)*
	time band selected
	dehumidification active
	ventilation active : % fan speed
1 2	*cooling active:* *- number (1 or 2) cooling actuators; % opening cooling valve, or (**in shelter mode**) % opening free cooling damper*
1 2	*heating active:* *- number (1 or 2) heating actuators* *- % opening valve*
	humidification active: % steam production
	programming phase
	- password setting *- parameter modification blocked*
8	*(in clock function) day of the week*
	- clock display *- clock set-up*

2.2 Status indicators

The main states of the regulator are displayed to the user through 3 LEDs on the front panel.

Fig. 3

Meaning of the LED (Fig. 3)

Line LED (yellow): control powered

Alarm LED (red): machine alarm (the siren symbol on the display is on only when the buzzer is active)

ON LED (green): machine ON from keypad or supervisor (referred to the EEPROM variable). The effective ON status of the machine may, in addition, depend on the ON-OFF digital input, on the active time band,
the stand-by condition transmitted from the master unit (if a series of units is in rotation), and is indicated by the illumination of the fan symbol.
The ON-OFF symbols on the Display are illuminated only when the input of the remote contact is enabled and indicate the status of such contact.

2.3 The keypad

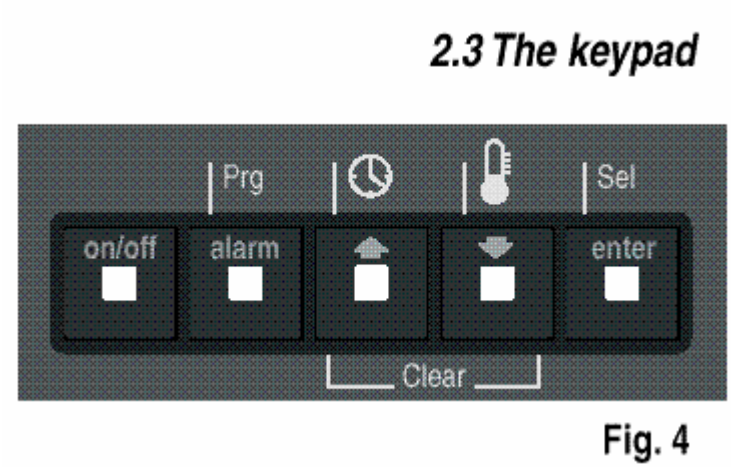


Fig. 4

The buttons have the following meanings:

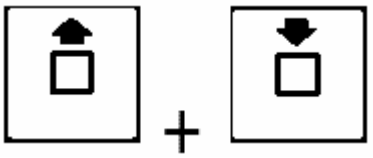
- Commutes status: if the machine is on, one press of the button places it in Standby; vice-versa, it is re-enabled.

- Pressed for 5 secs accesses the User parameters.
- In the presence of an alarm silences the buzzer.

- Repeated pressing displays, cyclically: the current time, date and the temperature of the air in the room.
- In programming phase scrolls or increases the value of the parameters.

- Held pressed displays the set-point.
- In programming phase scrolls or decreases the value of the parameters.

- Pressed for 5 secs accesses the Direct parameters.
- In programming phase modifies the value of the selected parameter (see par. 5.2 - Parameter modification)



- Pressed together for 2 secs reset the alarms.

3. Programming parameters and their modification

3.1 Parameters

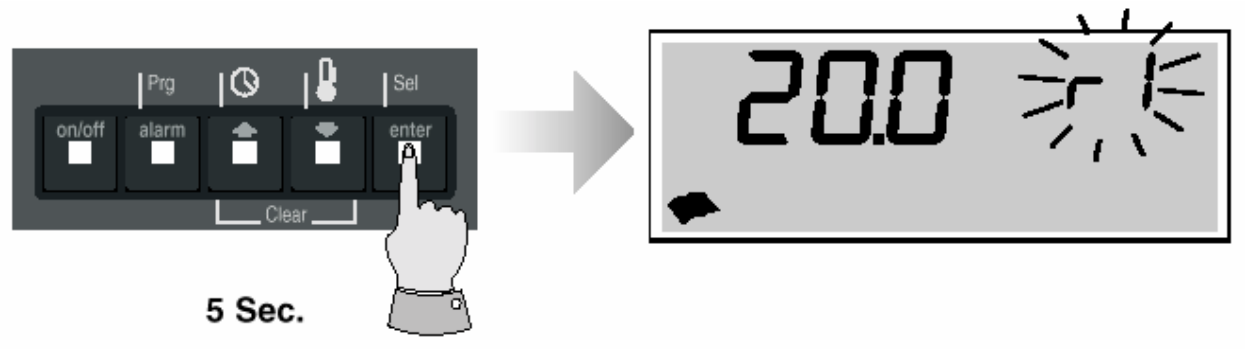
The parameters are divided into 3 levels, each of which contains the previous, which the user can access to customise the operation of the EMIPRO.

Level	*Access*
DIRECT (D):	*immediate access*
USER (U):	*access via password 22 (parameter HH)*

3.2 Parameter modification

Accessing Direct parameters (D)

The value of the first accessible parameter is displayed in the upper right, with the parameter code flashing.

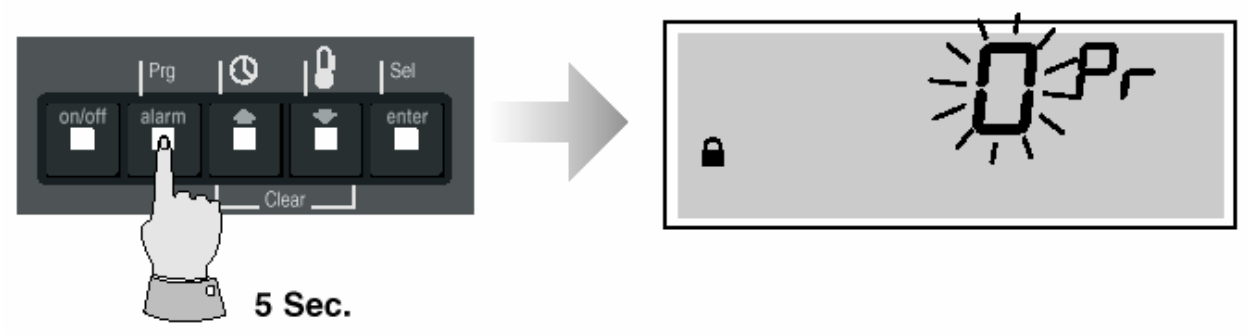


Accessing User parameters (U)

The number 0 is displayed and, on the left the lock symbol , confirming access via password to the procedure.

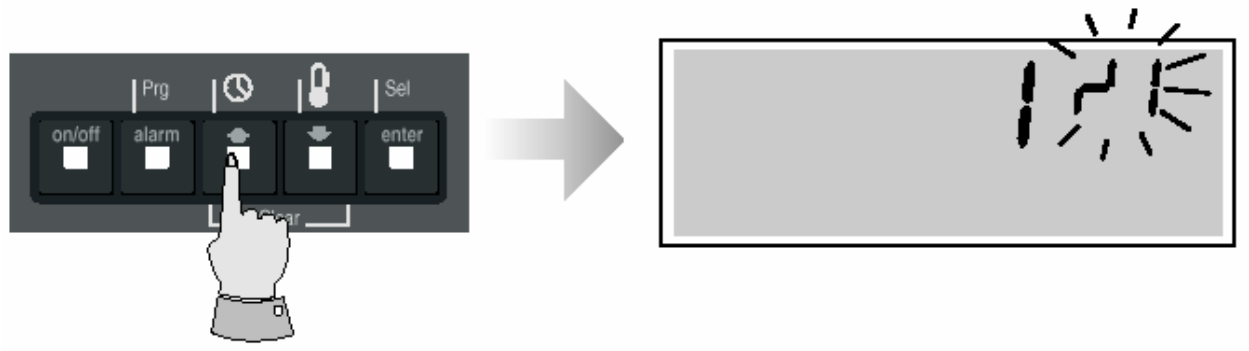
- The and buttons are used to enter the password **22** (default), which is confirmed by pressing the enter button.

The value of the first accessible parameter is then displayed in the upper right, with the parameter code flashing.

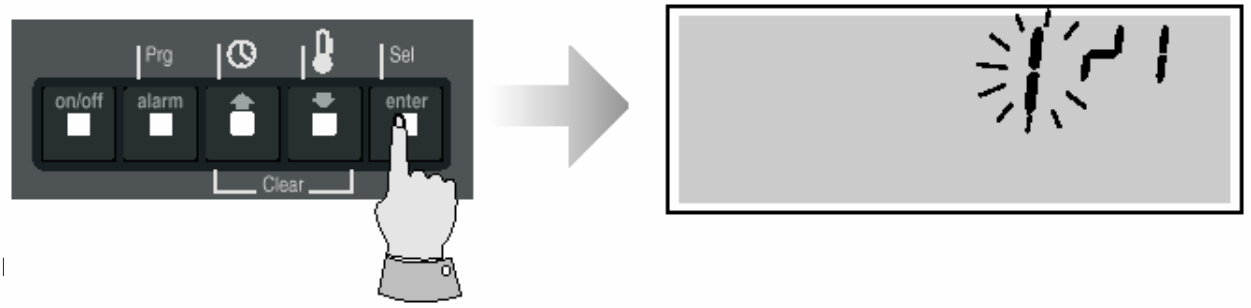


The value of the first accessible parameter is then displayed in the upper right, with the parameter code flashing.

The and buttons can be used to scroll the various parameters.



Once having entered any level of parameters, one pressing of the enter button displays the value, flashing, of the parameter selected, while the and buttons can be used to modify such value.



Then, using the buttons, scroll the parameters menu, repeating the previous steps for each parameter to be modified.

Press the button, on the other hand, to store the modifications made.

During all phases of setting the parameters the open book symbol is displayed in the lower left of the display; on the other hand, when setting the password, a lock also appears, confirming the presence of a "block".

4. Description and configuration of the parameters

/	Probes	Type 0 1 2 3	Min.	Max.	U.o.M.	Def.	New
1	Presence external air probe 0 = absent 1 = NTC Carel	F F U U	0	1	Flag	0	
2	Type of humidity/press./temp. probe B3 0 = absent 1 = 0-1Vdc or 0-20mA 2 = 4-20mA	F F F F	0	2	Flags	0	
3	Presence supply air B4 0 = absent 1 = NTC Carel (enable corresp. alarm)	F F F F	0	1	Flag	0	
4	Value of humidity/pressure at 0 mA, 4mA or 0Vdc	F F F F	0	/5	%rH bar	0	
5	Value of humidity/pressure at 20mA 0r 1Vdc	F F F F	/4	100	%rH bar	100	
6	Calibration probe B1	U F U U	-6.0 -10.8	6.0 10.8	°C °F	0.0	
7	Calibration probe B2	U F U U	-6.0 -10.8	6.0 10.8	°C °F	0.0	
8	Calibration probe B3	U F U U	-10.0	10.0	%rH bar	0.0	
9	Calibration probe B4	U F U U	-6.0 -10.8	6.0 10.8	°C °F	0.0	
A	Digital filter	U F U U	1	15	-	4	
b	Input limit	U F U U	1	15	-	8	
c	Unit of measure (0=°C,1=°F)	U U U U	0	1	Flag	0	

/	Probes	Type 0 1 2 3	Min.	Max.	U.o.M.	Def.	New
1	Temperature Set Point (cooling)	D D D D	rA	rb	°C/°F	20.0	
2	Cooling differential	D D D D	0.1 0.1	11.0 19.8	°C °F	3.0	
3	Heating differential	D D D D	0.1 0.1	11.0 19.8	°C °F	2.0	
4	Temperature dead zone	D D D D	0.1 0.1	11.0 19.8	°C °F	1.0	
5	Humidity Set Point	D D D D	rc	rd	%rH	50	
6	Humidification differential	D D D D	1	20	%rH	4	
7	Dehumidification differential	D D D D	1	20	%rH	3	
8	Humidity dead zone	D D D D	0	20	%rH		
9	Temperature Set Point (heating)	D D D D	rA	rb	°C/°F	18.0	
A	Minimum temperature set point (also for compensation)	U F U U	-20 -4	rb	°C °F	0	
b	Maximum temperature set point (also for compensation)	U F U U	rA	60 140	°C °F	50	
c	Minimum humidity set point	U F U U	0	rd	%rH	0	
d	Maximum humidity set point	U F U U	rc	100	%rH	100	
E	Type of temperature regulation 0=P, 1=PI	U F U U	0	1	Flag	0	
F	Integration time for PI action	U F U U	10	3600	s	600	
G	Authority (unique for Cooling/heating) for compensation	U F U U	-2.0	2.0		0.5	
H	Set Point compensation on temp. read by B2 (cooling)	U F U U	-20 -4	60 140	°C °F	25.0	
i	Set Point compensation on temp. read by B2 (heating)	U F U U	-20 -4	60 140	°C °F	10.0	
L	Free cooling differential	U F U U	0 0	30 54	°C °F	9	
n	Lower supply temperature limit during free cooling	U F U U	-20 -4	30 86	°C °F	5	
o	Reading from probe B2	D D D D			°C/°F		
P	Reading from probe B3	D D D D			%rH/bar		
r	Reading from probe B4	D D D D			°C/°F		
t	Time band setting 0 = disabled 1 = fan on minimum with temp. monitoring 2 = On/off	U U D D	0	2	Flags	0	

c	Compressor	Type 0 1 2 3	Min	Max	U.o.M.	Def	New
1	Minimum ON time	U F F F	0	300	s	60	
2	Minimum OFF time	U F F F	0	900	s	60	
3	Time between 2 start-ups	U F F F	0	900	s	360	
4	ON delay between the 2 compressors	U F F F	0	300	s	30	
5	OFF delay between the 2 compressors	U F F F	0	300	s	0	
6	Compressor rotation 0 = disabled 1 = enabled	F F F F	0	1	flag	0	
7	Delay comp. ON from supply fan start-up	U F U F	0	300	s	20	
8	Hour counter threshold for the compressor 0= disabled	U U U U	0	30000	h	0	
9	Hour counter compressor 1	D U D U	0	30000	h	0	
A	Hour counter compressor 2	D U D U	0	30000	h	0	

F	Fans	Type 0 1 2 3	Min	Max	U.o.M.	Def	New
1	Fan operating mode 0 = always ON 1 = proportional speed regulation. If used in condensation the fan is kept at minimum even below the value of F5 2 = proportional speed regulation. If used in condensation the fan is switched off below the value of F5, with an hysteresis of 0.5 bar for pressure or 1°C for temperature	F F F F	0	2	flags	1	
2	Minimum Triac voltage threshold	F F F F	0	F4	step	35	
3	Maximum Triac voltage threshold	F F F F	F3	100	step	75	
4	Triac pulse width	F F F F	0	15	ms	2	
5	% regulation band for minimum speed or temperature/pressure /4 bar for minimum speed in condensation	U F U F	0 0 /4	F6	% °C/°F bar	0.1	
6	% regulation band for maximum speed or temperature/pressure /5 bar for maximum speed in condensation	U F U F	F5	100 158 /5	% °C/°F bar	100	
7	Minimum output value	U F U F	0	F8	%	10	
8	Maximum output value	U F U F	F7	100	%	100	
9	Fan hour counter threshold 0 = disabled	U U U U	0	30000	h	0	
A	Supply fan hour counter	D U D U	0	30000	h	0	
b	Filter hour counter threshold 0 = disabled	U U U U	0	30000	h	0	
c	Filter hour counter	D U D U	0	30000	h	0	
d	Supply fan OFF delay	U F U F	0	900	s	20	
E	Fan pick-up time in condensation	U F F F	0	60	s	4	

P	Alarm	Type 0 1 2 3	Min	Max	U.M.	Def	New
1	Flow alarm delay from fan start-up	U F F F	0	250	s	20	
2	Flow alarm delay during operation	U F F F	0	90	s	5	
3	Low pressure alarm delay from compressor ON	U F F F	0	250	s	40	
4	Buzzer activation 0 = OFF, 1-14= min. 15= continuous	U U U U	0	15	min	0	
5	Reset alarms (various configurations)	F F F F	1	5	flag	1	
6	Delta from effective set point for low temperature alarm	U F U U	0	50 90	°C °F	10	
7	Delta from effective set point for high temperature alarm	U F U U	0	50 90 °F	°C	10	
8	Delta from set point for low humidity alarm	U F U U	0	50	%rH	20	
9	Delta from set point for high humidity alarm	U F U U	0	50	%rH	20	
A	Alarm delay high/low temperature/humidity on start-up	U U U U	0	150	min	20	
b	Type of management of generic alarm input ID5 0 = no alarm connected 1 = signal only alarm - automatic reset 2 = signal only alarm - manual reset 3 = serious alarm - automatic reset 4 = serious alarm - manual reset 5 = serious alarm - automatic reset also active in stand-by 6 = serious alarm - manual reset also active in stand-by	U F U F	0	6	flag	1	
c	Generic alarm delay	U U U F	0	250	s	60	
d	Return-supply temp. difference for supply temp. alarm	U F F F	0	20 36	°C °F	3	

H	General HL=	Type 0 1 2 3	Min	Max	U.M.	Def	New
1	Machine model 0 = ED unit 1 = CW unit 2 = CW unit (H/C) 3 = shelter	F F F F	0	3	flags	0	
2	No. of machines in rotation 0 = stand-alone machine 1 = 1 unit (master) 2 = 2 units.....6= 6 units	U U U U	0	6	flags	0	
3	Address of unit in rotation	U U U U	1	6	-	1	
4	Rotation time between a series of units 0 = test mode t=2 min.	U U U U	0	250	h	0	
5	Operating mode of the 2 “cool” outputs 1 = 1 compressor 2 = compressors on 2 circuits 3 = three-point valve 4 = 2 compressors in binary parallel 5 = 2 compressors in tandem (50+50%)	F F F F	1	5	flags	1	

6	Operating mode of the 2 “heat” outputs 0 = no heating element 1 = 1 heating element 2 = 2 heating elements 3 = three-point valve 4 = 2 heating elements in binary	F F F F	0	4	flags	1	
7	3P valve or damper excursion time	F F F F	0	600	s	150	
8	Presence of humidifier	F F F F	0	1	flag	0	
9	Type of dehumidification 0 = comp. 1 ON 1 = comp. 2 ON 2 = two comp. ON 3 = capacity-controlled cooling ramp 4 = fan speed reduction 5 = action 4+0 6 = action 4+1 7 = action 4+2 8 = action 4+3 9 = no action	F F F F	0	9	flags	0	
A	Function of the dehumidification/humidification relay 0= energised in dehumidification 1 = de-energised in dehumidification 2 = relay for non-serious alarms (follows logic of parameter HF) 3 = output for rotation control 4 = energised in humidification 5 = de-energised in humidification	F F F F	0	5	flags	0	
B	Function of output Y2 (phase-cut) 0 = supply fan speed control 1 = condensation fan speed control using B3 2 = condensation fan speed control using B2	F F F F	0	2	flags	0	
c	Function of probe B2 0 = compensation 1 = free-cooling using 0-10V 2 = free-cooling using Out3-Out4 3 = free-cooling ON/OFF with Out3 4 = condensation control	F F F F	0	3	flag	0	
d	Function of probe B3 0 = humidity control 1 = condensation control	F F F F	0	1	flag	0	
E	ON/OFF digital input 0 = absent 1 = present	U U U U	0	1	flag	0	
F	Alarm relay logic 0 = de-energised in alarm for all alarms 1 = energised in alarm for all alarms 2 = de-energised in alarm only for serious alarms 3 = energised in alarm only for serious alarms	U U U F	0	3	flags	0	
G	Delay on start-up	U U U U	0	300	s	0	
H	USER password	U U U U	0	200	-	22	
i	Block parameter modifications (displayed by lock) 0 = no block	U U U U	0	1	flag	0	
L	Parameter sets	F F F F	0	3	flags	0	
n	Select data shown on display 0= probes B1, B3 (if present) 1= temperature. and humid. set-point (if present) 2= day and time (if clock present)	U F U F	0	2	flags	0	

o	Supervisor network serial address	U U U U	1	200	-	1	
P	Supervisor serial baudrate 1= 1200, 2= 2400, 3= 4800, 4= 9600, 5=19200 Baud	U U U U	1	5	flags	5	
r	Software version	D D D D				1.1	

5. Clock, time bands and alarm log

Functions enabled only with the clock board memory installed.

5.1 Clock

Time display
Pressing the button displays the current time and date.
Pressing the button once displays the time and the day of the week (1= Monday, 2= Tuesday, ..., 7= Sunday); pressing it again displays the date in the format day-month-year.

Setting the time
First press the button (keeping it pressed) and then the **Prg** button, keeping both pressed for 5 seconds.

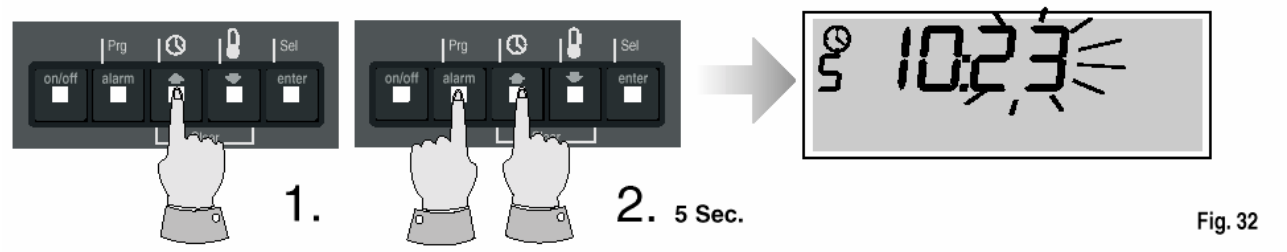


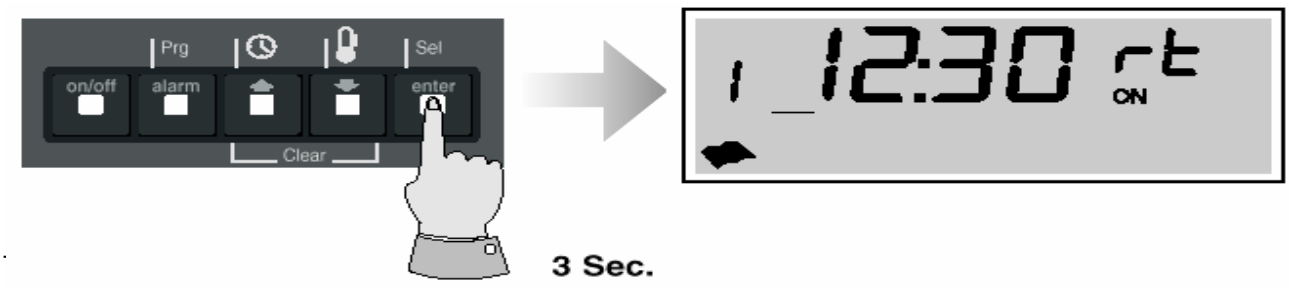
Fig. 32

The minutes will begin to flash; use the and buttons to set the desired time. Use the Sel button, on the other hand, to select, in order, the fields: hours - day of the week - year - month - day of the month. At the end, press the **Prg** button to confirm the modifications made.

5.2 Time bands

Entering the parameter rt (see USER parameter modification) allows the selection of **rt= 1 or 2**, enabling the time band function.
Pressing the **Sel** button displays, in sequence, with the scrolling of a segment, time bands 1, 2, 3, 4 of day 1 (Monday), ... , time bands 1, 2, 3, 4 of day 7 (Sunday). The and buttons allow, with 10 minute steps, the start time of the selected band to be modified, while the **ON/OFF** button enables or disables the action of the band itself, confirmed by the messages ON/OFF on the display.

Copying the time bands
If the times set for the bands are also valid for the following days, these can be simply copied by pressing and holding the **Sel** button for 3 seconds.
Once the copy has been made, the following day is automatically displayed: if this too is to be copied, release the **Sel** button and then press it again for a further 3 seconds.



N.B. The ON status controlled by the time bands is only valid if the machine is first activated from the keypad or the remote input (if enabled).
The OFF status controlled by the time bands, displayed by the "half moon" symbol on the display, acts according to whether parameter **rt** is set to 1 or 2:
rt= 1, Sleep mode: during the OFF status, the fan, works and the actuators remain off.

The machine is reactivated in the following conditions:
a) the temperature exceeds 70% of the high/low alarm threshold, returning to Sleep if the temperature falls within 40% of the alarm delta.
b) the ON/OFF is pressed: in this case the on status lasts until the next time band; during this period the symbol "A" flashes.
rt= 2: the machine is in stand-by, as if the ON/OFF had been pressed.
In this case too, pressing the **ON/OFF** button activates the machine until the next band switching OFF time.

5.3 Alarm log

In the event of an alarm the alarm code, hour, minute and data are recorded, up to a maximum of 300 signals. On reaching the maximum number the oldest events are deleted (code 1 always indicates the most recent alarm).

Display alarm log
To display the list of alarms recorded, press the button, followed by the **Alarm** button.

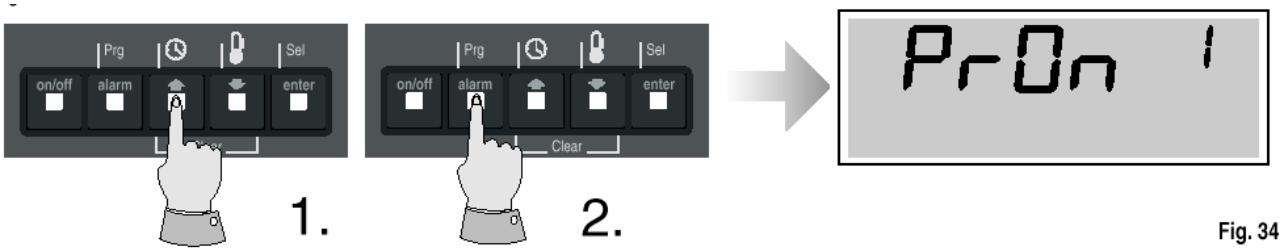
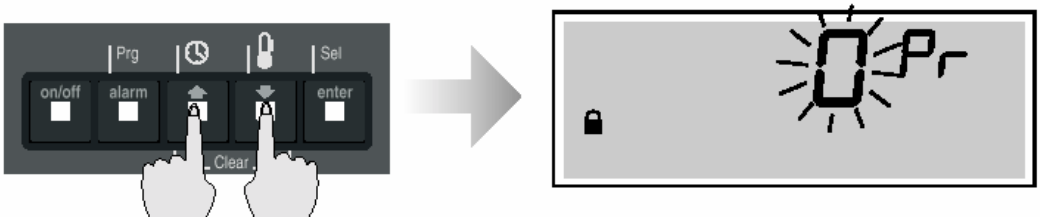


Fig. 34

The code of the last alarm event is shown, and, on repeatedly pressing **Sel**, the hour, minute and the date. The ⬆ *and* ⬇ buttons scroll the alarm data. In places where no alarm has been recorded, dashes are displayed in the place of the code.
The display includes an incremental index in the right-hand field, which identifies the current position; the hundreds then appear in the field on the left (e.g.: "1 rES 55" indicates that a reset of the machine was performed, and the position is 155).

Fig. 35

Deleting the alarm log
The entire alarm log can be deleted from within the display of log itself, by pressing the ⬆ *and* ⬇ buttons together for 5 seconds.
At this point the FACTORY password (177) is required, which, confirmed by enter, leads to the deletion of the log.



This operation re-initialises the clock board EEPROM and must be performed when installing the board itself.
The alarm codes displayed are those reported in the table in the chap-ter on the alarms; in addition, other special codes have been included to signal the following events:

Code	Meaning
PrOn	Machine re-start after power failure
rES	Manual alarm reset using the Alarm button

Exiting the alarm log
To exit the alarm log menu, press the Alarm button.
The menu is exited in any case by time-out, after 60 seconds.

6. Alarms and signals

In the event of an alarm, the machine performs the following actions:

- activates the buzzer and display , (if enabled and machine ON);
- activates the alarm relay (according to parameters HF, HA);
- displays the alarm code and switches on the corresponding red LED.

In this condition, pressing the alarm button silences the buzzer.
The termination of alarms with automatic reset, if no alarms with manual reset are active, brings about:

- the switching off of the buzzer;
- the deactivation of the alarm relay, see parameter HF;
- the switching off of the red alarm LED;
- the re-activation of the actuators switched off by the alarm.

Pressing the ⬆ *and* ⬇ buttons together for 2 seconds cancels the display of the alarm codes.
In the event of alarms with manual reset, pressing the ⬆ *and* ⬇ buttons together for 2 seconds brings about:

- the deactivation of the alarm relay, see parameter HF;
- the switching off of the red alarm LED;
- the re-activation of the actuators switched off by the alarm.

The maintenance signals for compressors 1 and/or 2, the fan and the filter, due to the exceeding of the hour counter thresholds, activate the symbol on the display, the red LED, the buzzer and the alarm relay.
The alarm messages are shown cyclically in the order indicated in the following table. On termination, the display of the percentage of humidity (if present) returns for 6 seconds.

6.1 Table of alarm

n.	Cod.	Description	Delay	Reset	Buzz.	Alarm	C1	C2	R1	R2	Sys/ON	Fan	Hum.	Dehum
1	E1	probe B1	1 min	P5	ON	ON	OFF	OFF	OFF	OFF	-	-	OFF	OFF
2	E2	probe B2	1 min	P5	ON	ON	-	-	-	-	-	-	-	-
3	E3	probe B3	1 min	P5	ON	ON	-	-	-	-	-	-	OFF	OFF
4	E4	probe B4	1 min	P5	ON	ON	-	-	-	-	-	-	-	-
5	Er: E	EEPROM boot	imm.	auto	-	-	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
6	EE	EEPROM run	imm.	auto	ON	ON	-	-	-	-	-	-	-	-
7	EL	insuff. power	imm.	auto	ON	ON	-	-	-	-	-	-	-	-
8	H1	high press C1	imm.	man	ON	ON	OFF	-	-	-	-	-	-	-
9	H2	high press C2	imm.	man	ON	ON	-	OFF	-	-	-	-	-	-
10	L1	low press C1	P3	P5	ON	ON	OFF	-	-	-	-	-	-	-
11	L2	low press C2	P3	P5	ON	ON	-	OFF	-	-	-	-	-	-
12	F1	filter dirty	imm.	P5	ON	ON	-	-	-	-	-	-	-	-
13	FL	flow	P1/2	P5	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
14	r1	heating elements	Imm.	man	ON	ON	-	-	OFF	OFF	-	-	-	-
15	At	supply temp	2min	P5	ON	ON	OFF	OFF	-	-	-	-	-	-
16	AH	humidifier	30 s	P5	ON	ON	-	-	-	-	-	-	OFF	-
17	Lt	low temp.	PA	P5	ON	ON	-	-	-	-	-	-	-	-
18	Ht	high temp.	PA	P5	ON	ON	ON	ON	-	-	-	-	-	-
19	LH	low humid.	PA	P5	ON	ON	-	-	-	-	-	-	-	-
20	HH	high humid.	PA	P5	ON	ON	-	-	-	-	-	-	-	-
21	tC	comp. thermal	imm.	P5	ON	ON	OFF	-	-	-	-	-	-	-
22	Tf	fan thermal	imm.	P5	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
23	AL	serious generic	PC	Pb	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
24	PA	power fail	2 s	auto	ON	ON	OFF	-	OFF	-	-	-	-	-
25	CL	clock	imm.	man	ON	ON	-	-	-	-	-	-	-	-
26	n1 +	hour counter threshold compressor 1	imm.	c9	ON	ON	-	-	-	-	-	-	-	-
27	n2 +	hour counter threshold compressor 2	imm.	cA	ON	ON	-	-	-	-	-	-	-	-
28	nf +	hour counter threshold filter	imm.	FC	ON	ON	-	-	-	-	-	-	-	-
29	nn +	hour counter threshold fan	imm.	FA	ON	ON	-	-	-	-	-	-	-	-

6.2 Alarm Description

Cod.	Description	P5= 1	P5= 2	P5= 3	P5= 4	P5= 5
E1	probe B1	auto	auto	man	auto	auto
E2	probe B2	auto	auto	man	auto	auto
E3	probe B3	auto	auto	man	auto	auto
E4	probe B4	auto	auto	man	auto	auto
EE	eeprom run	man	man	man	man	man
EL	insuff. power on EEPROM write	man	man	man	man	man
H1	high pressure C1	man	man	man	man	man
H2	high pressure C2	man	man	man	man	man
L1	low pressure C1	man	auto	man	auto	auto
L2	low pressure C2	man	auto	man	auto	auto
F1	filter dirty	man	auto	man	man	auto
FL	flow	man	auto	man	man	man
r1	heating elements	man	man	man	man	man
At	supply temp	man	auto	man	man	man
AH	humidifier	man	auto	man	auto	auto
Lt	low temperature	man	auto	man	auto	auto
Ht	high temperature	man	auto	man	auto	auto
LH	low humidity	man	auto	man	auto	auto
HH	high humidity	man	auto	man	auto	auto
tC	comp. thermal	man	auto	man	man	auto
tF	fan thermal	man	auto	man	man	auto
AL	serious generic	Pb	Pb	Pb	Pb	Pb
PA	power fail (shelters)	auto	auto	auto	auto	auto
CL	clock	man	man	man	man	man

6.3 Alarm signals

All the alarms, except for the generic external alarm (AL), configured by parameter Pb, and the clock, are detected only when the machine is ON.

E1: ambient temperature probe failure: generated due to open or short-circuited probe. Alarm delayed by 1 minute from the instant the machine is placed ON and when the error is detected. At the moment of detection the control is placed OFF, respecting the configured times, except for the fan.

E2: external air probe failure: generated due to open or short-circuited probe. Alarm delayed by 1 minute from the instant the machine is placed ON and when the error is detected. At the moment of detection the corresponding functions -compensation and free cooling are deactivated.
If probe B2 is used for condensation, the fan is forced on at maximum speed.

E3: humidity / pressure probe failure: generated due to open probe and for voltages above 1.15V, if the input is configured as 0÷1V, or, if the input is configured as 4÷20mA, for currents below 3mA and over 23mA. Alarm delayed by 1 minute from the instant the machine is placed ON and when the error is detected.
At the moment of detection the corresponding functions are deactivated:
- humidity control (humidification, dehumidification);
- if probe B3 is used as a pressure sensor, for the control of condensation, and probe B2 is present for reading the external air temperature, the fan is forced on at maximum speed if the temperature measured by B2>15°C. The same is true if probe B2 is not present.
- If the temperature B2² 15°C, on the other hand, the fan operates at half speed.

E4: supply air temperature probe: generated due to open or short-circuited probe.
Alarm delayed by 1 minute from the instant the machine is placed ON
and when the error is detected. At the moment of detection the corresponding functions are deactivated: supply temperature alarm management (At), and, if free-cooling is active with control of the supply temperature, the damper is closed.

EE: EEPROM data read/write error.
Can occur also during a reset only if it is not possible to make the correction to the secondary bank. This error does not affect the operation of the regulator.

EL: insufficient power supply during EEPROM write
Data write error to EEPROM due to power failure or power below 13Veff.

H1-H2: high pressure C1-C2
Detected irrespective of the activation of the compressor, and causes its immediate switching off without waiting the corresponding delay times.
The alarm H2 is managed only if parameter H5= 2 or 4 (two independent circuits).
If condensation fan regulation is present, this is activated for 60 seconds at maximum speed before switching off.

L1-L2: low pressure C1-C2
Detected only with the compressor on, and causes its immediate switching off without waiting the corresponding delay times.
The alarm is delayed by P3 seconds on the start-up of the compressor. If automatic reset is set, parameter P5, a compressor restart is attempted 10 times, then the alarm is automatic reset automatically.
The alarm L2 is managed only if parameter H5= 2 or 4 (two independent circuits).

F1: dirty filter
Signal-only alarm. No outputs are deactivated.

FL: air flow alarm
Alarm delayed by parameters P1 and P2.
The activation of this alarm causes the switching off of all of devices without waiting the delay times of the compressors and the fan.
If set for automatic reset, parameter P5, a restart of the outputs is attempted 10 times.

r1: heating element thermal overload alarm
Causes the immediate switching off of the heating elements.

At: high supply temperature alarm (cooling function)
Enabled by the presence of the supply air temperature probe B4 (parameter /2) and by the setting of parameter Pd.
The alarm has a fixed delay of 2 minutes, and is activated only if the cooling actuators are on and heating actuators are off.
In particular, the conditions leading to the activation of the alarm are:

- **ED:** at least one compressor on and heating elements off or heating valve closed;
- **CW:** cooling valve open more than 50% and heating valve closed or heating elements off.

This alarm, when detected, only blocks the compressor on at that moment, while the second compressor remains enabled.

AH: humidifier alarm
Alarm delayed by 30 seconds. If detected, the humidifier output (0÷10Vdc or relay) is deactivated.

Lt: low temperature alarm

Ht: high temperature alarm
These alarms are delayed on the start-up of the regulator (or on exiting stand-by mode) for a period equal to parameter PA, and for 1 minute on exceeding the set threshold. The reset occurs, if programmed as automatic, 1 degree above (Lt) and 1 degree below (Ht) the threshold.

In addition, exceeding the high temperature threshold causes the immediate start-up of the compressors without waiting the corresponding delay times.

LH-HH: low-high humidity alarm
These alarms are delayed on start-up (or on exiting stand-by mode) for a period equal to parameter PA, and for 1 minute from exceeding the set threshold.
These are signal-only alarms, with an hysteresis of 1% R.H.

tC: compressor thermal overload alarm
Immediate alarm, causes the instant switching off of the compressor.
This is managed only if parameter H5= 1 or 5 (one compressor only or two compressors in tandem).

tF: fan thermal overload alarm
Immediate alarm, causes the instant switching off of all devices without respecting the compressor delay times.
This is managed only if parameter H5= 1 or 5 (one compressor only or two compressors in tandem).

AL: generic external alarm
This alarm can be configured by setting parameters Pb and PC.
If configured as a serious alarm, it switches off all actuators without respecting the delay times.

PA: shelter power failure alarm
External power failure alarm delayed by 2 seconds.
This is generated for models configured as shelters when input ID6 is open; it causes the immediate switching off of the compressor and the heating element.

CL: clock failure alarm
Alarm generated by the malfunctioning of the clock board.
Interrupts the time band function, and the regulator goes into ON status if even the current band provides an off command. This event does not block the alarm log, which continues to store the signals, however with incorrect time values.

n1: compressor 1 maintenance warning

n2: compressor 2 maintenance warning
Signal-only alarm generated when the hour counter threshold has been exceeded, displayed together with the symbol, see parameters c9 (compressor 1) and cA (compressor 2).

nF: filter maintenance warning

nU: fan maintenance warning
n2: compressor 2 maintenance warning Signal-only alarm generated when the hour counter threshold has been exceeded, displayed together with the symbol, see parameters FC (filters) and FA (fan).

6.4 Machine shut-down signals

These appear in the event of internal machine malfunctions and cause its shut-down.
The code is displayed in the ambient temperature (or hour-minutes) field of the LCD display.

Er: C Checksum error during code check in Flash: the control can no longer be used.

Er: E The content of the EEPROM (parameter memory) is damaged.
A reset can be attempted by reloading the default values.

Er: L Insufficient power: Power voltage < 13Veff when writing the default values or during an attempt to automatically recovery an EEPROM damaged sector.